

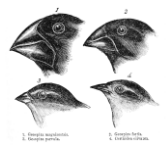


Over time this results in the formation of new species.

The theory of evolution by natural selection.

Species of all living things have evolved from simple life forms that first developed 3 billion years ago.

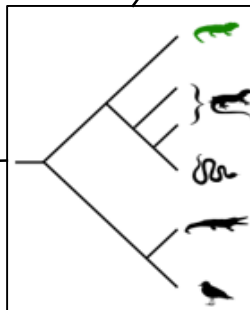
Through natural selection of variants (genotypes) that give rise to phenotypes best suited to their environment or environmental change e.g. stronger, faster. This allows for variants to pass on their genotype to the next generation.



Darwin's finches

Classification of living organisms

Use current classification data for living organisms and fossil data for extinct organisms



Evolutionary trees are a method used by scientists to show how organisms are related

Choosing characteristics

Desired characteristics are chosen for usefulness or appearance

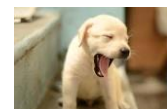
Disease resistance in food crops.



Animals which produce more meat or milk.



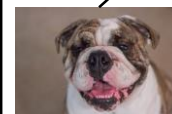
Domestic dogs with a gentle nature.



Large or unusual flowers.



Concern: effect of GMO on wild populations of flowers and insects.



Selective breeding can lead to 'inbreeding' where some breeds are particularly prone to disease or inherited defects e.g. British Bulldogs have breathing difficulties.

Humans have been doing this for thousands of years since they first bred food from crops and domesticated animals.

The process by which humans breed plants/animals for particular genetic characteristics

Selective breeding

Genetic engineering

Modern medical is exploring the possibility of GM to over come inherited disorders e.g. cystic fibrosis

Selective breeding

Choosing parents with the desired characteristics from a mixed population

Chosen parents are bred together.

From the offspring those with desired characteristics are bred together.

Repeat over several generations until all the offspring show the desired characteristics.

Concern: effect of GMO on human health not fully explored

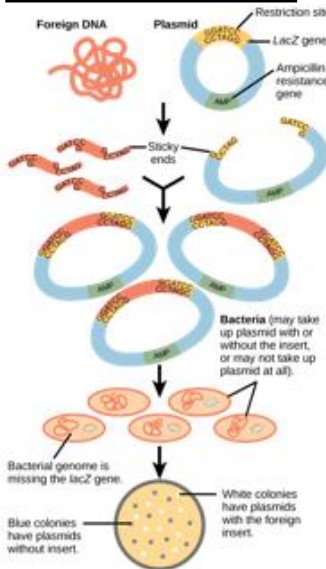
Genetic engineering process (HT only)

1. Enzymes are used to isolate the required gene.

2. Gene is inserted into a vector – bacterial plasmid or virus.

3. Vector inserts genes into the required cells.

4. Genes are transferred to plants/animals/microbes at an early stage of development so they develop the required characteristics.



Genes from the chromosomes of humans or other organisms can be 'cut out' and transferred to the cells of other organisms.

Genetically modified crops (GMO)

Crops that have genes from other organisms

To become more resistant to insect attack or herbicides.

To increase the yield of the crop.

Evolution

AQA GCSE INHERITANCE VARIATION AND EVOLUTION PART 3

Cloning (Biology only)

Cloning techniques in plants/animals

Tissue culture

Small groups of cells to grow new plants. Important for preservation of rare plants and commercially in nurseries.

Cuttings

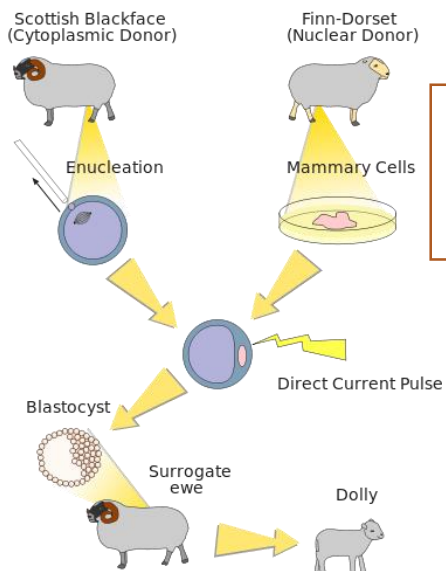
Part of a plant is cut off and grown into full plant.

Embryo transplants

Splitting apart cells from animals embryo before they become specialised. New clone embryos are inserted into womb of adult female.

Concern: some people have ethical objections to adult cell cloning e.g. welfare of the animals.

A change in the inherited characteristics of a population over time through the process of natural selection.



Adult cell cloning

1. Nucleus is removed from an unfertilised egg.
2. Nucleus from body cell is inserted into egg cell.
3. An electric shock stimulates the egg to divide into an embryo
4. Embryo cells are genetically identical to adult cells.
5. When embryo has developed into ball of cells it is inserted into host womb.